

# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

Nevada State Office  
P.O. Box 12000  
Reno, Nevada 89520-0006

IN REPLY REFER TO:  
6840 (NV-930) P

May 16, 2003

EMS TRANSMISSION 5/19/03

Instruction Memorandum No. NV-2003- 064

Expires: 9/30/2004

To: Field Managers, Nevada

From: State Director, Nevada

Subject: Pygmy Rabbit Surveys

Concern for the pygmy rabbit (*Brachylagus idahoensis*) continues to be growing throughout the West because of their apparent declines in the sagebrush biome. At a February 26, 2003 meeting, hosted by the Fish and Wildlife Service (FWS), of all of the affected states within the range of the pygmy rabbit, it was apparent that declines have occurred in historic occupied habitats in some states. Additional, current information about its distribution rangewide is needed.

The FWS recently published in the Federal Register the final rule (March 5, 2003) listing the pygmy rabbit, Columbia Basin distinct population segment, as endangered under the Endangered Species Act. The pygmy rabbit is presently being considered for inclusion as a Bureau of Land Management (BLM) sensitive species in Nevada.

### MANAGEMENT DIRECTION

In response to the concern for this species, it is incumbent that we begin to acquire information on this species. All field offices (FOs) should begin to survey for pygmy rabbits in relation to **all proposed ground disturbing activities, including issuance of rights-of-ways** in suitable habitat. Initial surveys for pygmy rabbits can be accomplished by biologists, range conservationists, archaeologists, fire ecologists, etc. This species can be easily confused with the jackrabbit (*Lepus spp.*) and cottontail rabbit (*Sylvilagus spp.*), especially their young. As a result, it is important that a global positioning system (GPS) location be taken of individual sightings or burrow complexes, so that individuals familiar with identifying pygmy rabbits can confirm the sighting. Wherever practicable, FOs should avoid ground disturbing activities in pygmy rabbit habitat. This will conform with our BLM 6840 policy for BLM sensitive species which directs that our actions should not contribute to the need to list a species (ref. Bureau 6840.060).

### TRAINING

Due to the similarity of the pygmy rabbit with young jackrabbits and cottontail rabbits we will make training available to any FO that requests it. Please feel free to contact Erick Campbell (775) 861-6471 at any time to make the necessary arrangements.

## SURVEY GUIDELINES

There is an interagency workgroup planning to develop survey guidelines for the pygmy rabbit, but the guidelines are not yet available. When the guidelines have been completed we will see that all FOs are made aware of them. Attachment 5 details some survey tips from the experience by University of Nevada researchers.

## PYGMY RABBIT SURVEYS

The following support materials are attached to assist you with your inventory, monitoring, and management efforts for the pygmy rabbit:

- Pygmy rabbit distribution in western North America (Attachment 1).  
(Please note the 1959 vintage of the map and that pygmy rabbits have been found in Wyoming).
- 2. Natural Heritage map of pygmy rabbit distribution in Nevada (Attachment 2).
- 3. The pygmy rabbit sighting report. The sighting report should be filled out for all suspecting pygmy rabbit sightings or suspected burrow locations (Attachment 3).
- 4. Pygmy Rabbit Species Profile (Attachment 4).
- 5. Pygmy Rabbit Survey Tips (Attachment 5).

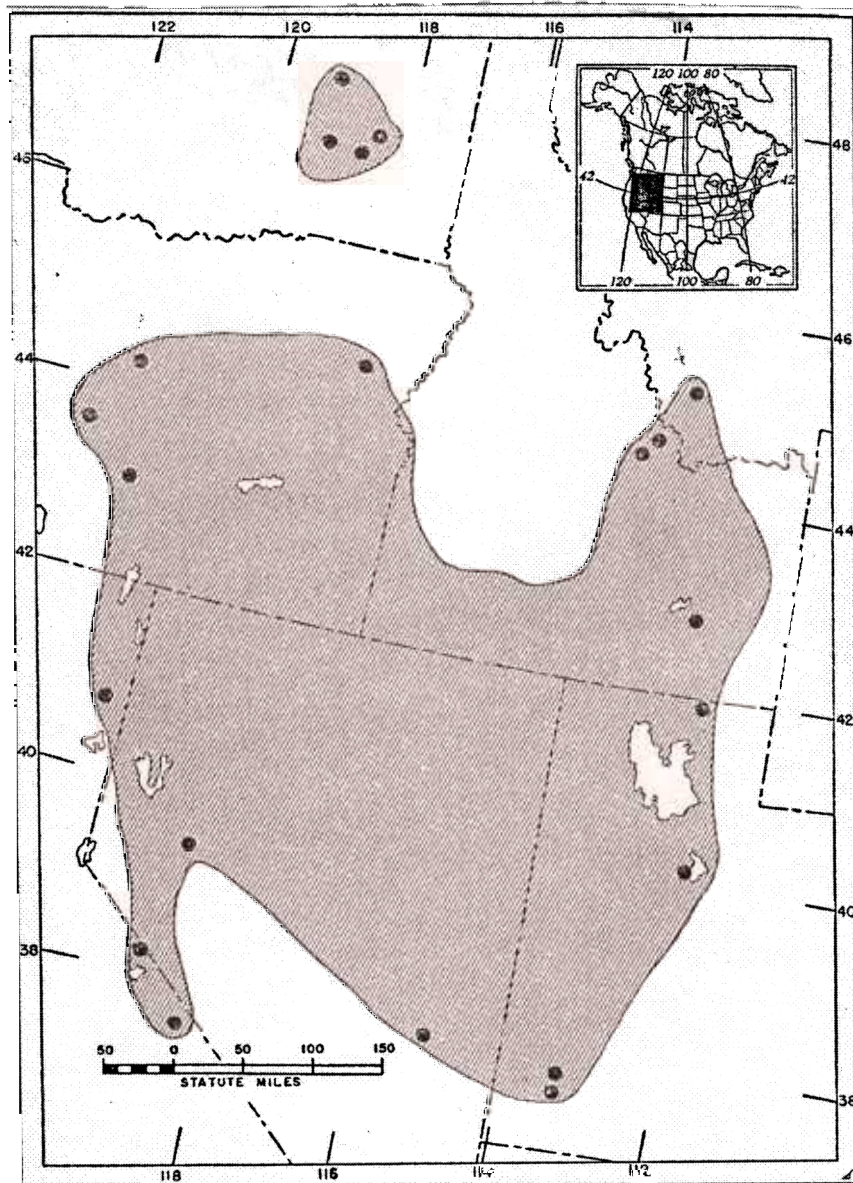
Long-term management considerations for the pygmy rabbit should be incorporated into each Resource Management Plan as they are revised.

If you have any questions or wish to provide any comments, please contact Erick Campbell (775) 861-6471.

  
Robert V. Abbey

### 5 Attachments

- 1 - Pygmy rabbit ( 1 p)
- 2 - Natural Heritage Map( 1 p)
- 3 - The pygmy rabbit sighting report (1 p)
- 4 - Pygmy rabbit species profile ( 12 pp)
- 5 - Pygmy rabbit survey tips ( 1 p)



*Brachylagus idahoensis*

(Hall and Kelson 1959)



## Nevada Natural Heritage Program

109 Mapped sightings  
of the pygmy rabbit

*Brachylagus idahoensis*

○ Identification Confirmed

● Identification Uncertain

1:3200000

50 0 50 Miles



Compiled by the Nevada Natural Heritage Program, February 2003



## PYGMY RABBIT

### *Brachylagus idahoensis*

**Description:** This is the smallest North American rabbit (10-11" long), almost as small as a pika. It is buffy grayish or blackish above with whitish spots at the sides of the nostrils, and the tail is gray above and below. Ears are short and rounded. It scampers rather than leaps. *The key distinguishing characteristic is the apparent lack of a tail compared to the mountain cottontail's obviously white tail.*



PYGMY RABBIT

**Similar species:** Adult cottontails are larger, and their tails are white and obvious. Juvenile cottontails are similar in size, but they have white tails.

**Sign and behavior:** Pygmy rabbits dig their own burrows, and they stick close to their burrow system. Burrows have several entrances with 6-12" oval openings, and some burrows have a shallow trench extending out from the entrance. Fecal pellets are small and round, about 1/4" in diameter. Primary food is sagebrush, particularly in winter. Grasses are more important in the summer. They are mainly nocturnal and crepuscular in the warm seasons.

**Habitat:** This species is closely associated with sagebrush, most often Basin big sagebrush. However, stands of large individuals of Wyoming big sagebrush (often associated with riparian areas) also are used.

**Range:** In Nevada this species has been found historically in the Upper Sonoran Life-zone in the northwestern, northern, and eastern part of the state south to northern Nye County.

## NEVADA PYGMY RABBIT SIGHTING REPORT

Name of Surveyor: \_\_\_\_\_

Address: \_\_\_\_\_

Email: \_\_\_\_\_ Phone: (\_\_\_\_) \_\_\_\_\_

Date of sighting: \_\_\_\_\_ Time of day: \_\_\_\_\_

Weather: \_\_\_\_\_

Location: (UTM coordinates or T/R/S): \_\_\_\_\_

Elevation: \_\_\_\_\_ Topo Sheet Name: \_\_\_\_\_ Scale: \_\_\_\_\_

Nearest landmark or road: \_\_\_\_\_

Type of sighting (visual, road kill, etc.): \_\_\_\_\_

I.D. confidence: \_\_\_\_\_

Description of habitat: \_\_\_\_\_

Habitat condition: \_\_\_\_\_

Additional information: \_\_\_\_\_

**SEND TO:** Nevada Natural Heritage Program, 1550 East College Parkway, Suite 145, Carson City, NV 89706-7291. **Please attach copy of topographic map with locality marked along with any photographs taken of the animal or its habitat.**

The correct address is now Suite 137, not Suite 145.

**Pygmy Rabbit (*Brachylagus idahoensis*)**

**Species Profile**

Compiled by:

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**Pygmy Rabbit (*Brachylagus idahoensis*) Species Profile**

**DISTRIBUTION**

- “The pygmy rabbit (*Brachylagus idahoensis*) is patchily distributed in the sagebrush-dominated areas of the Great Basin. This includes portions of Oregon, California, Nevada, Utah, Idaho, Montana, Wyoming, and [a disjunct population in] Washington” (McAllister 1995)
- Pygmy rabbits may be common locally, but they are rare at the landscape scale (Williams 1986).
- “Vertical range from about 4,500 to over 7,000 feet altitude in Nevada; zonal range mainly Upper Sonoran, but extending into the lower border of the Transition Zone.” (Nelson 1909)

*Oregon, Idaho, Wyoming, Montana, Utah, Nevada, and California*

- Distributional boundaries:
  - NORTH – southeastern Oregon through southern Idaho, including a small portion of western Wyoming (Campbell *et al* 1982)
  - EAST- southeastern Idaho to southwestern Utah, including a small portion of western Montana (Campbell *et al* 1982)
  - SOUTH – southwestern Utah (Janson 1946, Pritchett *et al* 1987) through central Nevada (Nelson 1909), including a small portion of east-central California near Bodie (Severaid 1950)
  - WEST – western Nevada through southeastern Oregon (Weiss & Verts 1984), including a small portion of northeastern California in Lassen County (Orr 1940)

*Washington Population*

- A single population remains at Sagebrush Flat, Douglas County, Washington.
- “Genetic analyses of pygmy rabbits in Montana, Idaho, Oregon, and Washington have confirmed that the Washington population of pygmy rabbit is distinct and isolated from the rest of the species' range, and has been separated for thousands of years.” (Hays 2001)
- “Available data indicate disjunction may have occurred during the latest Pleistocene and earliest Holocene.” (Lyman 1991)

## SYSTEMATICS

- *Brachylagus* is a monotypic genus (Nelson 1909), included as one of nine living genera in the Family Leporidae (Green & Flinders 1980a).
- “*Brachylagus* is currently a monotypic genus of uncertain origins and known only from Holocene and late Rancholabrean.” (Ramos 1999)
- “The [mitochondrial] data indicate that separate generic status for the pygmy rabbit, *Brachylagus idahoensis*, is warranted based on its phylogenetic position and sequence “divergence values.” (Halanych & Robinson 1997)
- There is a possible ancestral relationship between *Hypolagus* and *Brachylagus* based on fossil evidence of a “link” species (*Brachylagus coloradoensis*) described from early and middle Pleistocene (Irvingtonian) deposits which exhibits an intermediate tooth enamel pattern. (Ramos 1999)

## FOSSIL RECORD

- “[Fossil] data suggest[s] that the abundance of *S. idahoensis* was greatly reduced at the same time as Pleistocene Lake Bonneville fell to a level characteristic of modern times.” There is persuasive evidence “that pygmy rabbits declined in number throughout the sagebrush steppe in the Great Basin at about 7,000 B.P.” Fossil evidence from Gatecliff Shelter, “the Wasden Site, and the Connley Caves suggests that pygmy rabbits were much more abundant in the cool desert during the first 5,000, and especially the first 3,000, years, of the Holocene than they have been since that time.” Additional evidence from Hidden Cave also “suggests that pygmy rabbits were more widely distributed in the western Great Basin in the past than they are today.” (Grayson 1987)
- Extensive fossil evidence suggests that pygmy rabbits were much more abundant throughout the Great Basin during the late Pleistocene (Grayson 1993). Subsequent climate change at the end of the early Holocene with a corresponding decline in sagebrush vegetation probably led to the decline in abundance of pygmy rabbits ~7,000 years ago.
- Butler (1972) concluded that pygmy rabbits dramatically declined about 7,000 years ago based on remains that were found in a stratigraphic column beneath an owl roost that has been used for over 10,000 years.
- “Available data indicate disjunction [of the Washington population] may have occurred during the latest Pleistocene and earliest Holocene. Extralimital records indicate that the range of the pygmy rabbit decreased in eastern Washington during the last 3,000 years as the extent of sagebrush (*A. tridentata*)-dominated steppe diminished. Relative abundances of pygmy rabbits and pocket gophers (*Thomomys talpoides*) in eastern WA also appear to reflect responses to changes in the distribution and abundance of sagebrush.” [18 Great Basin mammal spp. have disjunction in E. WA similar to pygmy rabbit (Dalquest 1948). Conclusions are based on paleological evidence of pygmy rabbits at six archaeological sites (two others mentioned, however). Because there are

no archaeofaunal remains predating 8,000 ya, it is impossible to determine previous occupation of northern Columbia Basin by *B. idahoensis*.] (Lyman 1991)

- Abundant fossil evidence suggests that *Brachylagus* was common in south central Washington during the late Medithermal (Miller 1977).
- Estimates three possible routes of emigration from the Great Basin to the Awapa Plateau [of Utah], including one along ~ UT Hwy 24 along Peterson Crk. and two other potential routes that leave the Great Basin from NE Iron Co. (Pritchett *et al* 1987)
- “Given the tight association between pygmy rabbits and dense stands of big sagebrush, it again is extremely likely that *A. tridentata* began a substantial decline in this area after about 10,000 <sup>14</sup>C yr B.P.; and that soon after 8300 <sup>14</sup>C yr B.P., there were insufficient stands of big sagebrush to support populations of these animals.” (Grayson 2002)

## HABITAT

### *Vegetation Type*

- In California, pygmy rabbits are patchily distributed in sagebrush, bitterbrush, and pinyon-juniper habitats where it is associated with tall, dense, large-shrub stages of big sagebrush, greasewood, and rabbitbrush (Orr 1940; Laudenslayer 1982; Zeiner *et al* 1990). Pygmy rabbits may also occur in curleaf mountain mahogany, low sage, and saltbush-greasewood habitats (Laudenslayer 1982).
- In Idaho, occurs “where *Sarcobatus* is abundant or...dense stands of sagebrush...” (Davis 1939)
- “[In Utah] rabbits are found in Upper Sonoran life zone, and in monotypic sagebrush, sagebrush-*Chrysothamnus*- greasewood, or sagebrush-*Atriplex canescens*.” (Jansen 1946)
- While sagebrush is usually the dominate plant in areas occupied by pygmy rabbits, there is apparently no preference for a particular subspecies of *Artemisia* (Weiss & Verts 1984; White *et al* 1980; White *et al* 1982).
- “In summer, pygmy rabbits selected sites where grasses were abundant, and jackrabbits selected sites with an abundance of forbs. During the fall-winter, shrubs played a more prominent role in habitat selection by both.” (Conde 1982)

### *Vegetation Characteristics*

- The overall vegetation profile is much denser for occupied habitat than for areas of non-use (Katzner & Parker 1997).
- The following vegetation characteristics are greater in areas utilized by pygmy rabbits compared to adjacent areas of non-use:
  - woody/shrub cover (Green 1978; Green & Flinders 1980b; Gabler 1997; Gabler *et al* 2001)
  - sagebrush cover (Weiss & Verts 1984; Gabler 1997; Gabler *et al* 2001)



- forb cover (Gabler 1997; Gabler *et al* 2001)
- shrub height (Green 1978; Green & Flinders 1980b; Weiss & Verts 1984; Katzner & Parker 1997)
- structural diversity (Green 1978; Green & Flinders 1980b; Gabler 1997; Katzner & Parker 1997; Gabler *et al* 2001)
- total shrub density (Gabler 1997; Gabler *et al* 2001)
- density of big sagebrush (Katzner & Parker 1997)
- width of sagebrush (Katzner & Parker 1997)
- forb biomass (Green & Flinders 1980b)
- The following vegetation characteristics were found to be lower in areas utilized by pygmy rabbits compared to adjacent areas of non-use:
  - grass biomass (Green & Flinders 1980b)
  - forbs (Katzner & Parker 1997)
  - alkali sage (*A. longiloba*) (Katzner & Parker 1997)
  - low ground cover (Katzner & Parker 1997)
- “The only high-quality habitat for the pygmy rabbit (PR) is big sagebrush with >40% shrub cover...20-40% shrub cover provides marginal habitat, and >40% shrub habitat provides moderate-quality habitat in these communities. It does not matter whether or not the understory is perennial or annual grass. The PR also may occur in pinyon-juniper (PR) communities. 10-40% canopy cover provides moderate-quality habitat, and 40-70% canopy cover provides marginal habitat in PJ, irrespective of the age of the trees...The PR uses these habitats year-round.” (California Wildlife Habitat Relationships Program, Laudenslayer 1982)
- “At inhabited sites [in Oregon],...shrub height ( $84.4 \pm 5.8$  cm), and shrub cover ( $28.8 \pm 1.4\%$ ) were significantly greater ( $p < 0.05$ ) than at unoccupied adjacent sites, but percent basal area of perennial grasses ( $3.7 \pm 0.9\%$ ), density of annual grasses ( $5.2 \pm 2.1/1,000$  cm<sup>2</sup>), density of forbs ( $3.4 \pm 0.6/1,000$  cm<sup>2</sup>), and cryptogam cover ( $2.4 \pm 0.5\%$ ) were not.” (Weiss & Verts 1984)
- Gahr (1993) reports maximum shrub height of  $82.0 \pm 19.7$  cm at Sagebrush Flat, Washington.
- Katzer & Parker (1998) report a maximum shrub height of  $95.5 \pm 6.5$  cm at a site in Lincoln County, Wyoming.
- Dense *Artemisia tridentata* spp. *tridentata* stands accumulate more snow than areas of low rabbit use (Katzner 1994; Katzner & Parker 1997).

### ***Soil & Substrate***

- "...deep, friable soils are required for breeding, feeding, and resting..." (Davis 1939; Laudenslayer 1982)
- Pygmy rabbits prefer areas with greater soil strength (surface =  $0.8 \pm 0.2$  kg/cm<sup>2</sup> and subsurface =  $3.8 \pm 0.3$  kg/cm<sup>2</sup>) and soil depth ( $51.0 \pm 2.3$  cm), and there may also be a slight preference for coarser soil (Weiss & Verts 1984).
- Suitable areas have a greater sand and lower clay values than non-use sites (Gabler 1997; Gabler *et al* 2001).
- "Except for the clay component of subsurface soils, texture of surface and subsurface soils were not significantly different between sites occupied by pygmy rabbits and adjacent sites." (Weiss & Verts 1984)

### ***Burrows***

"Only rabbit to dig its own burrows." (Zeiner *et al* 1990)

- Burrows have several entrances. "One to 7 entrances may be present, although 2 were most common. Burrows were simple in structure and apparently had no chambers." (Wilde 1978)
- At Sagebrush Flat, Washington, average entrance diameter is  $19.2 \pm 4.9$  cm (Gahr 1993).
- "Slope and valley floor locations were preferred over plateaus and flats. Burrows and burrow entrances of slope and plateau burrows were larger than burrows on valley floors and flats." (Wilde 1978)
- "Burrows tended to be located on the lee side of hills and lava fronts, possibly because deeper soils accumulated there." (Wilde 1978)
- Zeiner *et al* (1990) report that burrows in California tend to be located in slopes oriented in a north-to-east direction.
- "Large burrows were used more than small burrows." (Wilde 1978)

### ***Status of Pygmy Rabbit Habitat in the Great Basin***

- "Fragmentation of sagebrush communities poses a potential threat to populations of pygmy rabbits, but the severity of the threat is presently unknown." (Weiss & Verts 1984)
- Sagebrush removal or other land uses pose future threats (Olterman & Verts 1972).
- Population status of pygmy rabbits in California is unknown, but populations are likely declining due to habitat loss caused by cultivation, overgrazing, brush clearing, and range fires (Airola 1980; Williams 1986).

- There is evidence that heavily grazed areas may be avoided by pygmy rabbits, which could adversely affect populations by reducing habitat availability (Clark & Stromberg 1987; Zeiner *et al* 1990).
- “Because this species is restricted to the most productive sagebrush sites, it has probably been affected greatly by agricultural and rangeland conversions. Future projects in suitable habitat should consider impacts on this species.” (Airola 1980)

### ***Status of Pygmy Rabbit Habitat in Washington***

- “The Washington rabbits represent a disjunct population that has declined because of large-scale conversion of deep soil sagebrush-dominated communities to cropland. The limited distribution and isolated nature of Washington populations make the pygmy rabbit in [Washington] very vulnerable to local extirpations.” (Cassidy *et al* 1997)
- “Habitat degradation and loss are likely to continue [in Washington] without active prevention efforts... Recovery strategies for this species include protection of existing habitat, identification and management of lands for creation of new habitat, monitoring of the pygmy rabbit population, and research to better understand the effects of management actions. Grazing, if it occurs in pygmy rabbit areas, should be managed to be compatible with pygmy rabbit habitat needs. In all pygmy rabbit areas, steps should be taken to reduce the risk of range fire. To increase the extent of pygmy rabbit habitat, efforts should be directed at identifying lands where soil conditions are suitable for pygmy rabbits. If necessary, lands with appropriate soil conditions should be restored or enhanced to provide pygmy rabbit habitat.” (McAllister 1995)

### **DIET**

- Gahr (1993) observed pygmy rabbits of Sagebrush Flat, Washington eating the following:
  - Shrubs: big sage (*Artemisia tridentata*), green rabbitbrush (*Chrysothamnus viscidiflorus*)
  - Grasses: bluebunch wheatgrass (*Agropyron spicatum*), crested wheatgrass (*Agropyron desertorum*), Indian ricegrass (*Oryzopsis hymenoides*), needle and thread greass (*Stipa comata*) Thurber’s needle grass (*Stipa thurberiana*), cheat grass (*Bromus tectorum*)
  - Forbs: fiddle-neck tarweed (*Amsinckia* spp.), bastard toad-flax (*Comandra umbellata*), yarrow (*Achillea millefolium*), paintbrush (*Orthocarpus* spp.), mustard (*Brassica* spp.)
- “[In Idaho] the pigmy rabbit was found to feed primarily on big sagebrush (*Artemisia tridentata*) but was also observed eating other plants.” (Bradfield 1975)
- “[In Idaho] while sagebrush is the primary food source, pygmy rabbits also eat goosefoot, saltbush, rabbit brush, greasewood, dock and nettles.” (Larrison 1981)
- “[In Idaho] Scat analysis revealed that sagebrush, *Artemisia tridentata*, was the single most important food item, especially during the winter (90%). Grass and forb intake increased during the summer, but never accounted for more than 64% of the identified plant fragments.” (Wilde 1978)

- “[In Idaho] sagebrush was eaten throughout the year, although in lesser amounts in summer (51%) than in winter (99%). Grasses and forbs were eaten through the summer (39 and 10%, respectively) and decreased in the diet through fall to winter.” [Wheatgrass and bluegrass were highly preferred foods in the summer period while forbs were eaten only occasionally in all sites.] (Green 1978; Green & Flinders 1980b)
- “Grasses provide ca. 40% of diet from mid-summer to fall.” (Zeiner *et al* 1990)

## **BEHAVIOR**

### ***Habitat use***

- Burrows are located at the base of sagebrush, and most activity is within 30m (100 ft) of burrow (Zeiner *et al* 1990).
- “Burrows were used more during winter, which coincided with maximum trapability of rabbits.” (Wilde 1978)
- “In dense brush may use forms [created by thick woody material] during day [for cover] instead of burrows.” (Zeiner *et al* 1990)
- “In winter [pygmy rabbits make] a network of subnivean trails at bases of shrubs.” (Zeiner *et al* 1990)
- Pygmy rabbits forage both on the ground and in shrubs (Zeiner *et al* 1990; Gahr 1993).

### ***Activity Patterns***

- Described as crepuscular or diurnal (Larrison 1981; Zeiner *et al* 1990).
- Pygmy rabbits are active yearlong, but they are most active in the late spring and early summer (Larrison 1981; Zeiner *et al* 1990)
- “Fewer males were captured in the fall and spring than summer and winter. (Wilde 1978)
- “[In Idaho, pygmy rabbits were] active primarily in the mid-morning hours. Frequency of activity was influenced primarily by weather and to a certain extent by the photoperiod. Little activity occurred below the temperature of 45.5oC and above the temperature of 27.2oC. Population[s] in the study area reached two definite peaks in May and August and low points in July and December. Winter activity was limited to a search for food and was restricted to tunnels which the pigmy rabbit dug under the surface of the snow.” (Bradfield 1975)

“Pygmy rabbits were active at low levels (35% of the day), with no apparent patterns or circadian cycles. Activity levels were influenced by the combination of thermal variables defined as standard operative temperature.” (Katzner 1994)

- Gahr (1993) observed a sustained level of activity throughout the daylight hours.
- Multiple rabbits have been observed using a single burrow. (Gahr 1993).

### ***Home Range& Movement Patterns***

- Based upon BMR and body size of the animal, McNab’s (1963) method predicts a home range of 0.8 ha. (Green & Flinders 1979)

- “Home range sizes were similar to previous approximations, yet 70% of pygmy rabbits home ranges were composed of more than one use area....Home range size appeared to be determined more by amount of above-snow vegetative cover than forage resource supplies.” (Katzner 1994)
- “We suggest that size of HRs used by pygmy rabbits is influenced more by amount of vegetative cover than by forage.... HR differed significantly between yrs. (due to different snowfall patterns) and ranged across yrs. from 548 to 18,464 m<sup>2</sup> per animal. Boundaries of adjacent core areas were never > 100 m apart, and were usually <50 m apart....Assuming circular HRs, movements averaged 13-53 m. Snowfall most strongly affected size and structure of HRs.” (Katzner & Parker 1997)
- Remained within 35 m of burrows during the fall in Lassen County (Orr 1940), within 30 m in Idaho (Green & Flinders 1979), and 27 m in Utah (Janson 1946). However, Gahr (1993) noted average home ranges of up to 24.9 ha (min convex polygon) in Washington.
- Maximum distance between radio-telemetry locations in Washington was 1200 m (Gahr 1993). Males during the breeding season moved the longest distances.

### ***Dispersal***

- “A juvenile female pygmy rabbit escaped from a holding pen and recaptured 211 days later 200 m from its original capture site and 2.5 km from the pen facility.” [Previous maximum movements observed ranged from 140 – 500 m.] (Green 1978; Green & Flinders 1979)
- “Radio telemetry data suggest little adult emigration occurred [during a 2 ½ year study of a population in Idaho].” (Wilde 1978)
- Katzner & Parker (1998) reports on the movement of a radio-collared pygmy rabbit a total distance of 3.5 km away from a study site in Wyoming. The animal “used clumps of sagebrush as resting and foraging sites when crossing otherwise unsuitable habitat.” Before emigration, “its daily movements averaged 29.5 +/- 5.0 (SE) m, and the maximum distance between telemetry locations was 104 m.” Vegetation characteristics of burrows used by rabbits at the study sites were similar to those used by the emigrating individual.

## **BREEDING BIOLOGY & DEMOGRAPHY**

### **Age structure**

- *No information found.*

### **Sex ratio**

- Gahr (1993) found ~1:1 ratio of males to females in Sagebrush Flat, Washington.
- “Adults [like juveniles] had an equal sex ratio [1:1 in Idaho].” (Wilde 1978)

### **Litter size / Reproductive potential**

- Females breed the year following their birth (Wilde 1978; Fisher 1979), and parturition of 2-3 litters per year occurs from late May to early August (Hall 1946; Wilde *et al* 1976; Green & Flinders 1980a).



- “Females which survived the breeding season were calculated to have produced 13.0 and 13.7 young per female in 1975 and 1976 respectively. These estimates were based on a mean litter size of 6.0 (+/- 0.6) produced from a mean number of 6.4 (+/- 0.5) ova.” (Fisher 1979)
- Average litter size is 5-6 young (Hall 1946; Wilde 1978; Zeiner *et al* 1990) [range: 4-8 (Clark & Stromberg 1987)].
- “Gestation lasts 27-30 days, and individuals reach adult size by 10 weeks.” (Clark & Stromberg 1987)
- “The reproduction potential of this species is lower than most lagomorph species studies to date and fewer surplus animals may be available to sports hunters than other rabbits.” (Fisher 1979)

### **Breeding biology**

- “Breeding [in Wyoming] starts late in December to January and continues through March.” (Clark & Stromberg 1987)
- “Breeding [in Idaho] is initiated in late winter and continued until July.” (Wilde *et al* 1976)
- Mates from late February-early May [in California] (Zeiner *et al* 1990).
- “Adult females commenced breeding in late February to mid March...” (Fisher 1979)
- “Adult males appeared to be capable of breeding from January to mid June.” (Fisher 1979)
- “Photoperiod appears to determine the reproductive condition of males, condition of the vegetation females.” (Wilde 1978)
- Burrows probably are nest sites (Zeiner *et al* 1990).

### **MORTALITY**

- In Idaho, mortality of adults was found to be higher in late winter and early spring and lowest during late summer and early fall. Juvenile mortality was highest from birth to 5 weeks of age. Annual mortality in this population was estimated at ~88% (Wilde 1978).
- Populations in Washington have been extirpated by wildfires (Hays 2001).
- “Mortality likely caused by tularemia (rabbit fever).” (Hall 1946)

### **Predators**

- The following are known predators of pygmy rabbits:
  - weasels (*Mustela frenata*, Wilde 1978; Green & Flinders 1980a)
  - coyotes (*Canis latrans*, Dice 1926; Janson 1926; Wilde 1978; Green & Flinders 1980a)
  - red fox (*Vulpes vulpes*, Janson 1946; Green & Flinders 1980a)

- owls (Janson 1946; long-eared, Borrell & Ellis 1934; great-horned, Brodie & Maser 1967; Butler 1972; great-horned, Williams 1975; Wilde 1978; *Bubo spp.*, Green & Flinders 1980a; Gahr 1993)
- hawks (*Circus cyaneus*, Janson 1926; Wilde 1978; Green & Flinders 1980a)
- bobcats (*Felis rufus*; Gashwiler *et al* 1960)
- possibly badgers (Green & Flinders 1980a)
- Robinette *et al* . (1959) report evidence that cougars in Utah and Nevada consume cottontails (*Sylvilagus spp.*), which at the time of publication could have included pygmy rabbits.

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## **Pygmy Rabbit Survey Tips**

(Eveline Sequin)

1. Look for larger or taller sage patches
2. Look for friable light colored soil
3. Walk directly to these areas
4. Look for burrows and pellets
5. Verify current activity

1. Pygmy rabbits prefer large, dense clumps of sage. In Nevada, when there are a lot of rabbits present in a valley they will be distributed throughout the area. However, when there are only a few individuals these few are generally located in the largest, most dense clumps of vegetation. When you scan across a valley these sites stand out as taller, or as having a different color. It is fairly effective to go directly to these areas to begin your search.

2. Secondly, soil type makes a difference as well. Pygmy rabbits prefer light colored, friable (fluffy) soils. These are often associated with cryptobiotic soils in the less disturbed areas. These soils are usually in valley bottoms and can be associated with rabbitbrush / sagebrush vegetation. Pygmy rabbits can be found in other soil types, but if they are in the area they seem to be in these.

3. These characteristics can easily be identified by surveyors while they are driving along dirt roads. Look for the light soils and then walk out to the largest sage clumps in those areas.

4. Once in those locations look for burrowing activity and for pellets. The burrows can be pretty big considering the size of the animals. Often lighter soil from below the surface has been brought up making the digging fairly obvious. In the mixed rabbitbrush/sagebrush areas the burrow entrances are often partly concealed under rabbitbrush. Next look for SMALL pellets. Pygmy pellets are often in little piles around the burrows and under sagebrush. Fresh ones are a good indicator that your site is presently active.

5. Finally, if burrows or pellets are found you need to determine whether the site is currently active.